

Appl. No. : 10/781,247
Filed : February 18, 2004

REMARKS

The specification has been amended to correct a clerical error. Support can be found in Figs. 1 and 2, for example. The claim has been amended to clarify the invention. Support can be found in Figs. 1 and 2, for example. Claims 23-27 have been added, and support can be found in paragraphs [0013] and [0014] on page 4, for example. Claims 28 and 29 have been added, and support can be found in claims 3 and 4, for example. No new matter has been added. Applicant respectfully requests entry of the amendments and reconsideration of the application in view of the amendments and the following remarks.

Affirmation of Election

In response to the election/restriction requirement, Applicant provisionally elected Invention I, claims 1-8, drawn to apparatus, without traverse. Applicant affirms herein the above election, and claims 9-22 have been withdrawn from further consideration.

Drawing Objection

Drawings have been objected to because reference number 9 is not mentioned in the description. In the description, reference number 9 was erroneously indicated as 10. The description has been amended to correct the error, thereby obviating this objection.

Claim Interpretation

The Office action states: "In claim 6, '... a controller which activates the electromagnetic wave generator only for reactor cleaning ...', the last part 'only for the reactor cleaning' is a functional language, does not structural limitation. Any controller that is connected to wave generator meet the claim because it is capable of turning on the wave generator only for reactor cleaning."

Claim 6 has been amended to recite "a controller which is set to activate the electromagnetic wave generator only for reactor cleaning." The set controller is not any controller that is capable of turning on the wave generator only for reactor cleaning, but the specifically configured controller. Applicant respectfully requests the claim 6 be interpreted accordingly.

The Office action states: "In claim 7, '... to an axis of radio-frequency electrodes arranged in the reactor ...', in the cases when there are more than two RF electrodes, any axis of any two

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RF electrodes will meet the claim. When the reactor chamber wall is a grounded RF electrode, there are multiple axes, any one of these axes will meet the claim.”

Claim 7 has been amended to recite “to an axis of the susceptor and the showerhead.” The axis of the susceptor and the showerhead is the specifically defined axis, not any axes. Applicant respectfully requests that claim 7 be interpreted accordingly.

Rejection of Claims 1-3 and 8 Under 35 U.S.C. § 102

Claims 1-3 and 8 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Stinnett (US20010003678, hereafter ‘678). Claim 1 is independent and has been amended to clarify the subject matter recited therein. Claim 1 recites:

A thin-film deposition system comprising:
an evacuable plasma CVD reactor comprising a susceptor and a showerhead;
an RF power generator arranged outside the plasma CVD for forming plasma discharge between the susceptor and showerhead;
a remote plasma chamber arranged outside the plasma CVD reactor, for providing active species to an interior of the plasma CVD; and
an electromagnetic wave generator arranged **outside** the plasma CVD reactor, the RF power generator, and the remote plasma chamber, for emitting electromagnetic waves to the interior of the reactor for cleaning an inner surface of the reactor.

According to claim 1, due to **the electromagnetic wave generator arranged outside the plasma CVD reactor, the RF power generator, and the remote plasma chamber, for emitting electromagnetic waves** to the interior of the reactor **for cleaning** an inner surface of the reactor, reactions between the cleaning active species and unwanted reaction products accumulated on an inner surface of the reactor can be facilitated.

As the Office action mentions, in ‘678, a thin-film deposition system is shown in Fig. 8. However, ‘678 states: “in this chamber, there is no additional plasma generating equipment in the vacuum chamber 60, and no bias is applied to the pedestal 62. As a result, the excited gas plasma etching the wafer 64 does so without any directional acceleration across a plasma sheath, and the resulting etch is both soft and isotropic.” ‘678 in paragraph [0028]. Thus, it is clear that in Fig. 8 of ‘678, no RF power generator is provided, and the electromagnetic wave generator is the only generator and used for plasma generation.

Also as the Office action mentions, ‘678 states: “It is also possible to add a remote plasma source to a capacitively or inductively coupled plasma reactor, e.g., the MXP+. The combination

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chamber can then be operated in either the isotropic RPS mode or the anisotropic local plasma mode or a combination of the two.” ‘678 in paragraph [0029]. The above statements may suggest that a main plasma generator and a remote plasma chamber be used. However, ‘678 teaches in no way that in addition to an RF power generator and a remote plasma chamber, **an electromagnetic wave generator is arranged outside the plasma CVD reactor, the RF power generator, and the remote plasma chamber, for emitting electromagnetic waves** to the interior of the reactor **for cleaning** an inner surface of the reactor.

At least for the reasons above, each and every element of claim 1 cannot be found in ‘678, and claim 1 cannot be anticipated by ‘678. The remaining claims depend ultimately from claim 1, and at least for this reason, the remaining claim also cannot be anticipated by ‘678. The other grounds for rejection are moot.

Rejection of Claims 1 and 6-7 Under 35 U.S.C. § 102

Claims 1 and 6-7 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Cox (US6418874, hereafter ‘874). Claim 1 is independent and has been amended as discussed above.

The Office action states: “[‘874 teaches] an electromagnetic wave generator (#28, toroidal plasma source) arranged outside the plasma CVD reactor and the remote plasma chamber, for emitting electromagnetic waves to the interior of the reactor (toroidal plasma source is to provided energy to the interior of the reactor).”

However, first, ‘874 does not teach “**an RF power generator** arranged outside the plasma CVD for forming plasma discharge between the susceptor and showerhead” in addition to the electromagnetic wave generator. Further, in ‘874, the electromagnetic wave generator (#28, toroidal plasma source) is **not** arranged outside the **evacuatable** plasma CVD reactor. It appears that the Office action construes the chamber body (14) to be a plasma CVD reactor because the electromagnetic wave generator (28) is arranged **inside** the chamber top (16). However, as show in Fig. 1, the chamber body (14) and the chamber top (16) both constitute the interior of the camber (70) and thus the chamber body (14) and the chamber top (16) combined must be considered to be the evacuatable plasma CVD reactor. Accordingly, unlike claim 1, in ‘874, the electromagnetic wave generator (28) is arranged **inside** the **evacuatable** plasma CVD reactor. Furthermore, in ‘874, the electromagnetic wave generator (28) is not provided for **cleaning** an inner surface of the reactor.

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At least for the reasons above, each and every element of claim 1 cannot be found in '874, and claim 1 cannot be anticipated by '874. The remaining claims depend ultimately from claim 1, and at least for this reason, the remaining claim also cannot be anticipated by '874. The other grounds for rejection are moot.

Additionally, claims 6 and 7 have been amended as explained above. '874 does not teach a controller which is set to activate the electromagnetic wave generator only for reactor cleaning (claim 6), or the electromagnetic wave generator connected to a side wall of the reactor in a direction perpendicular to an axis of the susceptor and the showerhead (claim 7). Thus, for the above additional reasons, claims 6 and 7 cannot be anticipated by '874.

Rejection of Claim 4 Under 35 U.S.C. § 103

Claim 4 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over '678 further in view of Shang (US 6172322, hereafter '322).

Claim 4 depends ultimately from claim 1. As explained above, claim 1 cannot be anticipated by '678. Neither '678 nor '322 teaches providing an electromagnetic wave generator for cleaning an inner surface of the reactor, in addition to an RF power generator and a remote plasma generator. No prior art or evidence shows similar devices improved in the same way as in claim 1 or to yield results which could predict the significance of claim 1. Thus, claim 1 cannot be obvious over '678 and '322, and this rejection is moot. At least for this reason, claim 4 also cannot be obvious over '678 and '322.

Rejection of Claim 5 Under 35 U.S.C. § 103

Claim 5 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over '678 further in view of Houchin (US 5202095, hereafter '095).

Claim 5 depends ultimately from claim 1. As explained above, claim 1 cannot be anticipated by '678. Neither '678 nor '095 teaches providing an electromagnetic wave generator for cleaning an inner surface of the reactor, in addition to an RF power generator and a remote plasma generator. No prior art or evidence shows similar devices improved in the same way as in claim 1 or to yield results which could predict the significance of claim 1. Thus, claim 1 cannot be obvious over '678 and '095, and this rejection is moot. At least for this reason, claim 5 also cannot be obvious over '678 and '095.

New claims

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Claims 23-29 have been added. These claims depend ultimately from claim 1 which is not anticipated by or obvious over the prior art as discussed above. At least for this reason, these claims cannot be anticipated by or obvious over the prior art.

CONCLUSION

In light of the Applicant's amendments to the claims and the foregoing Remarks, it is respectfully submitted that the present application is in condition for allowance. The grounds for rejection which are not discussed here are moot. Should the Examiner have any remaining concerns which might prevent the prompt allowance of the application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

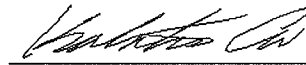
Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: November 13, 2007

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